

Application No.: 09/697,570
Amendment dated February 2, 2004
Reply to Notice of Allowance of November 6, 2003

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Previously Presented) An actuator for moving a driven member, said actuator comprising:
 - a displacement element for producing a specific displacement;
 - a drive member connected to one end of said displacement element and which transfers the displacement of said displacement element to a driven member;
 - a stationary member which supports the other end of the displacement element;
 - a compression member for pressing said drive member against the driven member such that the drive member and the driven member are in a state of intermittent contact, and under conditions near a condition of transition from the intermittent contact state to a normal contact state; and
 - a drive circuit for driving said displacement element.
2. (Previously Presented) An actuator as claimed in claim 1, wherein a following relationship is satisfied:
$$Nt=X0(1/(1/k2+1/k3)-1/(1/k1+1/k2+1/k3))$$
when a spring constant of the compression member is designated k1, a combined spring constant of the displacement element and the drive member is designated k2, a spring constant of the driven member is designated k3, an amount of displacement of the displacement element is designated X0, and a compression force applied by the compression member is designated Nt.
3. (Original) An actuator as claimed in claim 2, wherein said drive circuit drives said displacement element at a resonance frequency.

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4. (Original) An actuator as claimed in claim 1, wherein said drive circuit drives said displacement element at a resonance frequency.

5. (Previously Presented) An actuator as claimed in claim 1, wherein said displacement element is a laminate type piezoelectric element.

6. (Previously Presented) An actuator as claimed in claim 5, wherein said displacement element includes alternating layers of a plurality of piezoelectric thin plates and electrodes.

7. (Currently amended) An actuator for moving a driven member, said actuator comprising:

- a first displacement element for producing a first specific displacement;
- a second displacement element for producing a second specific displacement having a direction which has a predetermined angle to a direction of the first specific displacement direction of said first displacement element;
- a drive member connected to one end of each of said first and second displacement elements and which transfers the displacement of said first and second displacement elements to a driven member;
- a stationary member which supports the other end of each of the first and second displacement elements;
- a compression member for pressing said drive member against the driven member such that the drive member and the driven member are in a state of intermittent contact, and under conditions near a condition of transition from the intermittent contact state to a normal contact state; and
- a drive circuit for driving said first and second displacement elements.

8. (Previously Presented) An actuator as claimed in claim 7, wherein a following relationship is satisfied:

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$$Nt=X_0(1/(1/k_2+1/k_3)-1/(1/k_1+1/k_2+1/k_3))$$

when a spring constant of the compression member is designated k₁, a combined spring constant of the first and second displacement elements and the drive member is designated k₂, a spring constant of the driven member is designated k₃, an amount of displacement of the first and second displacement elements is designated X₀, and a compression force applied by the compression member is designated N_t.

9. (Original) An actuator as claimed in claim 8, wherein said drive circuit drives said first and second displacement elements at a resonance frequency.

10. (Original) An actuator as claimed in claim 7, wherein said drive circuit drives said first and second displacement elements at a resonance frequency.

11. (Previously Presented) An actuator as claimed in claim 7, wherein each of said first and second displacement elements is a laminate-type piezoelectric element.

12. (Previously Presented) An actuator as claimed in claim 11, wherein each of said first and second displacement elements includes alternating layers of a plurality of piezoelectric thin plates and electrodes.